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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,380	09/10/2003	Woo-Jong Lee	277/ 021	3327
7590	09/22/2004		EXAMINER	
LEE & STERBA, P.C.				SCHINDLER, DAVID M
Suite 2000				
1101 Wilson Boulevard				
Arlington, VA 22209				
				ART UNIT
				PAPER NUMBER
				2862

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/658,380	LEE ET AL.
	Examiner David Schindler	Art Unit 2862

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-8 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-8 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 9/10/2003 is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because:
 - 1) It is stated in the specification on page 6, line 1-2 that Figure 2 is the fluxgate according to an embodiment of the present invention. The specification also states on page 7, line 2, that the fluxgate includes an AND gate. It is unclear where this AND gate fits into Figure 2;
 - 2) It is also unclear where the A/D converter connects to the pulse controller in Figure 2. Furthermore, it is vague from the specification and drawings as to how Figures 2,3 and 4 are interconnected.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:

- 1) It is unclear how the circuit will know when the A/D converter has completed its conversion.
- 2) It is also unclear what component determines that the conversion has been completed.
- 3) There is a period missing in the last sentence of the last paragraph of the last page.
- 4) The phrase "the pulse controller outputs a high level signal when the fluxgate initiates a drive" which is stated in paragraph 1 of page 4 is unclear. The use of the term

"when" in said phrase implies that the fluxgate will initiate a drive before the pulse controller outputs a high. Applicant states that the pulse controller sends a high to allow the pulse to be applied to the current amplifier. Thus, it appears that the high level signal should be sent before the drive commences to excite the magnetic substance. Please clarify.

5) Applicant states "... from the pulse controller to send output to ..." in paragraph 1 of page 4. This sentence is awkward. One recommendation is to change the sentence to read "... from the pulse controller to send an output to ..." Appropriate correction is required.

Claim Objections

4. Claims 1-7 are objected to because of the following informalities:
5. Claims 1,3-6 state, in one variation or another, an action that occurs until something determines that the A/D converter has completed its conversion. It is not clear what determines that the conversion is complete. It is also not clear how this determination is made.
6. In Claim 1,
7. Claim 1 includes the following structural components: a driving coil (150), a current amplifier (30,31), a pulse generator (120), an A/D converter (170), a pulse

controller (110), and a fluxgate (100). It is unclear if the components listed above comprise the fluxgate (100), or if there is a second fluxgate;

8. Claim 1 states the phrase “a current amplifier...” in line 3. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify;

9. Claim 1 states the phrase “a fluxgate having a pulse generator for generating a pulse to turn on/off the current amplifier” in lines 5-6. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify;

10. Claim 1 states the phrase “ a pulse controller for outputting a control signal allowing the pulse to be applied to the current amplifier ...” in lines 9-10. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify.

11. In Claim 2,

12. Claim 2 states the phrase “... the pulse controller to send output ...” in line 3. This phrase is awkward. One recommendation is to change the phrase to “ ... the pulse controller to send an output ...”;

13. Claim 2 states the phrase “... to send output to the current amplifier” in line 3. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify.

14. In Claim 3,

15. In Claim 3, the scope of the claim is not clearly understood from the language of the claim. The phrase “the pulse controller outputs a high level signal when the fluxgate initiates a drive, and the pulse controller outputs a low level signal when it is determined that the conversion of the analog signal...” in lines 1-3 is confusing. The pulse controller is a component of the fluxgate and only outputs a signal when the A/D is converting. Thus the fluxgate only initiates a drive when the pulse controller outputs a high, not the opposite which is what claim 3 states. Please clarify.

16. In Claim 6,

17. In Claim 6, the scope of the claim is not clearly understood from the language of the claim. The phrase “driving the pulse controller when the fluxgate initiates a drive ...” in line 8 is confusing. The pulse controller is a component of the fluxgate and only outputs a signal when the A/D is converting. Thus the fluxgate only initiates a drive when the pulse controller outputs a high, not the opposite which is what claim 6 states. Please clarify;

18. Claim 6 states the following phrase in two places “ ... to be applied to the current amplifier” in lines 10 and 12. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify;

19. Claim 6 states “a current amplifier for applying current to first and second ends of the driving coil” in lines 1-2. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify.

20. In Claim 7,

21. Claim 7 states “ ... to send output to the current amplifier” in lines 3-4. It is unclear if the sensing apparatus has more than one current amplifier. (The specification and drawings disclose two current amplifiers among other places on (page 1, last two lines), (page 2, line 3), (page 7, line 1), and figures 1-2). Please clarify.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. Claims 1,5, and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (AAPA) in view of Dunne (6,282,803) and in further view of Hormel (4,622,843).

24. As to claim 1, AAPA discloses a driving coil for generating current to excite a magnetic substance core with current (page 1, last paragraph), a pulse generator for generating signals to turn the current amplifiers on and off (page 2, paragraph 1), and current amplifiers for applying pulses to the first and second ends of the driving coil (bottom of page 1 and top of page 2). AAPA does not disclose an A/D converter for converting an analog signal from the fluxgate into a digital signal, and also does not disclose a pulse controller for outputting a control signal allowing the pulse to be applied to the current amplifier until it is determined that the conversion of the analog signal into the digital signal by the A/D converter is completed. Dunne discloses an A/D converter for converting an analog signal from the fluxgate into a digital signal (column 8, lines 12-30), and a pulse controller for outputting a control signal allowing pulses to be applied until it is determined that the conversion of the analog signal into the digital signal by the A/D converter is completed (column 4, lines 30-52). Hormel discloses a pulse controller that outputs a pulse to be applied a fluxgate driver which contains the current amplifier ((column 4, paragraph 2) and (figure 2a, Fluxgate Saturation Driver (40)). It would have been obvious to modify AAPA to include an A/D converter for converting an analog signal from the fluxgate into a digital signal as taught by Dunne in order to allow

a controller to process the data digitally. It would have been obvious to modify AAPA to include a pulse controller for outputting a control signal allowing the pulse to be applied until it is determined that the conversion of the analog signal into the digital signal by the A/D converter is complete as taught by Dunne in order to ensure proper timing. It would have been obvious to modify AAPA in view of Dunne to include a pulse controller that outputs a pulse to be applied to the current amplifier as taught by Hormel in order to ensure that the driving coil received a large enough current. It is noted that the controller/processor derived from the prior art inherently wait for the conversion of the analog signal into a digital signal to be completed before altering their control signal outputs. This rationale is applied from here on out to the rest of the claims. It is also noted that Figure 2a of Hormel displays the current amplifiers in the Flux Gate Driver, 40.

25. As to claims 5 and 6, AAPA-Dunne-Hormel discloses as explained above. Dunne further discloses "a controller that generates a pulse to block current from flowing into a driving coil of the fluxgate when it is determined that conversion of an analog signal from the fluxgate to a digital signal is completed by an A/D converter" (column 4, lines 51-52). It is noted that this would prevent the pulse from the pulse generator from being applied to the amplifiers. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include "a controller that generates a pulse to block current from flowing into a driving coil of the fluxgate when it is determined that conversion of an analog signal from the fluxgate to a digital signal is

completed by an A/D converter.” The motivation for doing so would have been to help prevent unwanted leakage current from affecting the drive coil and thus generating unwanted readings. It is noted that it is inherent that when the fluxgate initiates a drive, the pulse generator, which is apart of the fluxgate, is driven as well.

26. Claims 2,3,4,7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA-Dunne (6,282,803)- Hormel (4,622,843) in view of Hawks (5,744,956).

27. As to claims 2 and 7, AAPA-Dunne-Hormel discloses as explained above. AAPA-Dunne-Hormel does not disclose “an AND gate for logical AND-ing the pulse from the pulse generator with the control signal from the pulse controller to send an output to the current amplifier.” Hawks discloses the use of an AND-gate for logical AND-ing the pulse from the pulse generator with the control signal from a controller to send an output ((column 9, lines 37-48) and (figure 5)). It would have been obvious to modify AAPA-Dunne-Hormel to include the use of an AND-gate for logical AND-ing the pulse from the pulse generator with the control signal from a controller to send an output as taught by Hawks in order to help prevent unwanted leakage current from effecting the drive coil.

28. As to claims 3 and 8, AAPA-Dunne-Hormel-Hawks discloses as explained above. Dunne further discloses “a pulse controller that outputs a high level signal when the fluxgate initiates a drive and a controller that outputs a low level signal when it is

determined that the conversion of the analog signal into the digital signal by the A/D converter is completed" (column 4, paragraph 3). At the time of the invention it would have been obvious to a person of ordinary skill in the art to include "a controller that outputs a high level signal when the fluxgate initiates a drive and a controller that outputs a low level signal when it is determined that the conversion of the analog signal into the digital signal by the A/D converter is completed." The motivation for doing so would have been to allow the circuit to be able to be zero calibrated. This rationale can be found in Dunne on lines 9-21 in the abstract.

29. As to claim 4, AAPA-Dunne-Hormel-Hawks discloses as explained above. Dunne further discloses "a controller that outputs the low level signal a predetermined time period after determining that the conversion of the analog signal into the digital signal is completed." At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a controller that outputs a low level signal a predetermined time period after determining that the conversion of the analog signal into the digital signal is completed. The motivation for doing so would have been to prevent some other signal from interfering with the low level signal.

Conclusion

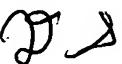
30. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. This includes: U.S. Pat. No. 5,333,110 to Al-Attar which discloses a controller, a fluxgate, a fluxgate driver (with amplifiers), and an A/D, U.S. Pat No.

5,223,821 to Poe et al. which discloses a control signal from a controller and a pulse generator being AND-ed together, and U.S. Pat. No 5,376,245 to McLeod which discloses a controller, an A/D converter, and a magnetometer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Schindler whose telephone number is (571) 272-2112. The examiner can normally be reached on M-F (8:00 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Le can be reached on (571) 272-2233. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


David Schindler


JAY PATIDAR
PRIMARY EXAMINER